

Appl. No. 10/708,354
Amdt. dated August 02, 2005
Reply to Office action of May 04, 2005

Amendments to the Specification:

Please replace paragraph [0020] with the following amended paragraph:

- 5 [0020] Fig.4 is a section view of an IPS-LCD according to a first embodiment of the present invention.

Please replace paragraph [0021] with the following amended paragraph:

- 10 [0021] Fig.5 is a top view of a lower substrate of the IPS-LCD shown in Fig.4.

Please replace paragraph [0022] with the following amended paragraph:

- 15 [0022] Fig.6 is a section view of an IPS-LCD according to a second embodiment of the present invention.

Please replace paragraph [0023] with the following amended paragraph:

- 20 [0023] Fig.7 is a top view of a lower substrate of the IPS-LCD shown in Fig.6.

Please replace paragraph [0024] with the following amended paragraph:

- [0024] Fig.8 is a section view of an IPS-LCD according to a third embodiment of the present invention.

- 25 Please replace paragraph [0025] with the following amended paragraph:

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[0025] Referring to Fig.4 and Fig.5, Fig.4 is a section view of an IPS-LCD 100 according to a first embodiment of the present invention, and Fig.5 is a top view of a lower substrate 102 of the IPS-LCD 100 shown in Fig.4. The present invention IPS-LCD 100 comprises a lower substrate 102, an upper substrate 104, and a plurality of liquid crystal molecules 106 filled between the lower substrate 102 and the upper substrate 104.

Please replace paragraph [0026] with the following amended paragraph:

[0026] The lower substrate 102 has a plurality of parallel scan lines 108 and a plurality of data lines 110 shown as bended lines with equal distances thereon. The scan lines 108 and the data lines 110 are arranged in a crossing manner to form a pixel matrix. Any two of the adjoining scan lines 108 and any two of the adjoining data lines 110 are crossed to define a pixel 116. In the crossover region of each of the scan lines 108 and the data lines 110 contains at least one electric device, such as a TFT 120, as a switching device of the pixel 116. The lower substrate 102 further contains, on the upper surface of the lower substrate 102, a plurality of the first electrodes 112 in each of the pixels 116, an insulation layer 114 positioned on the first electrodes 112 and the scan lines 108, and a plurality of the second electrodes 118 parallel with the data lines 110 in each of pixels 116. Each of the first electrodes 112 contains a plurality of first electrode offshoots 112a, 112b, 112c with equal distances parallel with the data lines 110, and the second electrode 118 covers the first electrode offshoot 112b (as shown in Fig.5).

Please replace paragraph [0027] with the following amended paragraph:

[0027] In this embodiment, the first electrodes 112 and the second electrodes 118 are used as the common electrodes and the pixel electrodes of the IPS-LCD 100 respectively, and the overlapping portions of the second electrodes 118 and the first electrode offshoots 112b serve as storage capacitors of the pixels 116. The first electrodes 112 and the second

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electrodes 118 are disposed in a single-layer structure or a multi-layer structure comprising titanium (Ti), aluminum (Al), aluminum based alloy, indium tin oxide (ITO), or other conductive materials. Furthermore, as shown in Fig.4, the IPS-LCD 100 of the present invention further comprises a first polarizer 120a on the bottom surface of the lower substrate 102, a second polarizer 120b on the upper surface of the upper substrate 104, a first alignment film 122a on the upper surface of the lower substrate 102, and a second alignment film 112b on the bottom surface of the upper substrate 104.

Please replace paragraph [0029] with the following amended paragraph:

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[0029] Referring to Fig.6 and Fig.7, Fig.6 is a section view of an IPS-LCD 150 according to a second embodiment of the present invention, and Fig.7 is a top view of a lower substrate 152 of the IPS-LCD 150 shown in Fig.6. The IPS-LCD 150 comprises a lower substrate 152, an upper substrate 154, and a plurality of liquid crystal molecules 156 filled between the both substrate. The lower substrate 152 has a plurality of parallel scan lines 158 and a plurality of data lines 160 with equal distances thereon, wherein the scan lines 158 and the data lines 160 are arranged in a crossing manner to form a plurality of pixels 162. Each pixel 162 contains a common electrode 164, a pixel electrode 166, and a TFT 174.

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Please replace paragraph [0030] with the following amended paragraph:

[0030] In this embodiment, each of the common electrodes 164 in a pixel 162 contains three common electrode offshoots 164a, 164b, 164c, and each of the pixel electrodes 166 contains two pixel electrode offshoots 166a, 166b. The common electrode offshoots 162a, 162b, 162c and the pixel electrode offshoots 166a, 166b are parallel with each other in the pixel 162. Each of the pixels 162 further contains a plurality of capacitor electrodes 168 (Fig.7 shows two capacitor electrodes) which are parallel with each other and under the

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pixel electrode offshoots 166a, 166b. As shown in Fig.6, the pixel electrode offshoots 166a, 166b is positioned above the capacitor electrodes 168, and the width of the capacitor electrodes 168 is smaller than or equal to the width of the pixel electrode offshoots 166a, 166b. The lower substrate 152 further contains an insulation layer 176
5 covering the scan lines 158, the common electrodes 164, the common electrode offshoots 164a, 164b, 164c, and the capacitor electrodes 168. The upper substrate 154 and the lower substrate 152 comprise alignment films 170a, 170b on the inside surfaces thereof for aligning the arrangement direction of the liquid crystal molecules. The upper substrate 154 and the lower substrate 152 further comprise polarizers 172a, 172b on the outside
10 surfaces thereof for guiding the scattering direction of light beams to increase the brightness of the IPS-LCD 150.

Please replace paragraph [0032] with the following amended paragraph:

15 [0032] Fig.8 is a section view of an IPS-LCD 200 according to a third embodiment of the present invention. As shown in Fig.8, the common electrode offshoots 212a, 212b, 212c, and the common electrode offshoots 212d, 212e, 212f are arranged in two different planes of the lower substrate 202. Under this design, horizontal electric fields are produced by the adjoining pixel electrode offshoots 216a, 216b and common electrode offshoots 212d,
20 212e, 212f, which effectively shorten the responding time of the liquid crystal molecules 206 than the first and second embodiment of the present invention. The overlapping portions of the pixel electrode offshoots 216a, 216b and the capacitor electrodes 214 are used as storage capacitors for providing the electricity switching on the pixels. In the IPS-LCD 200, the data lines (not shown), the pixel electrode offshoots 216a, 216b, and
25 the common electrode offshoots 212a, 212b, 212c, 212d, 212e, 212f are all parallel with each other and shown as straight lines or bended lines. When fabricating the IPS-LCD 200, the common electrode offshoots 212a, 212b, 212c, and the capacitor electrodes 214

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can be made with the same materials and by a single process. Similarly, the pixel electrode offshoots 216a, 216b and the common electrode offshoots 212d, 212e, 212f can be made together in a single deposition process and a single etching process. Accordingly, the goal of raising the opening ratio and improving the performance according to the third
5 embodiment can be reached without extra processes. In another embodiment of the present invention, the capacitor electrodes 214 can be replaced by common electrode offshoots to achieve the same purpose. The application of the common electrode offshoots is a well-known technology by those skilled in the art, so that detailed description will not provided.

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